Growing a Greener Future

ICRISAT's Medium-Term Plan 2008-2010 - A Synopsis

ICRISAT

Science with a Human Face

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Why Medium-Term Plans?

In 2006 we developed our Vision and Strategy to 2015. To fulfill this Vision, we write three-year Medium-Term Plans (MTPs), updating them annually. These MTPs guide our specific activities that lead to the attainment of the Vision.

This brochure highlights our Medium-Term Plan for 2008-2010. The full Plan is available for download from our website.

Current and emerging challenges and opportunities

The rolling MTPs enable us to annually adjust to changing circumstances and emerging priorities and opportunities. Such trends that are apparent during this planning period include:

- Strengthening host-country relationships, including novel tripartite partnerships engaging both the government and the private-sector with ICRISAT;
- The crucial roles played by recently-established pan-African institutions and frameworks such as FARA, NEPAD and CAADP;
- Increasing donor interest in overcoming longstanding fundamental problems in Africa such as its debt burden, hunger, poverty, malnutrition and AIDS, all of which have strong agricultural tie-ins; and
- The 'globalization' of our research agenda on emergent issues of bioenergy, high-value crops, water scarcity, land degradation, food safety, health and nutrition, and climate change.

Changes since the previous MTP

This 2008-10 MTP is evolutionary, not revolutionary. We've set an effective course, as evidenced by our 'Superior' rating in 2006 and 'Outstanding' rating in 2007 by the World Bank against institutional performance metrics, and the donor confidence reflected in our solid and sustained growth in total budget (63% increase during 2002-06).

Clearly there is much we are doing right. Nevertheless we are resolved not to become complacent. We are actively catalyzing new initiatives to seed future growth and to continuously reinvigorate our agenda. These initiatives, briefly mentioned in the previous section, are highlighted in more detail later in this brochure.

Evaluating our work

Our progress is frequently reviewed to ensure continuing relevance, quality and effectiveness. Topically-focused Center-Commissioned External Reviews are carried out each year, culminating in an External Programme and Management Review (EPMR) every fifth year. Our next EPMR will begin in 2008.

The guiding light: the Integrated Genetic and Natural Resources Management (IGNRM) Approach

Our central approach, elucidated in the Vision and Strategy, is 'integrated genetic and natural resources management' (IGNRM), adopted in 2005. But what does this mean?

IGNRM emphasizes positive **synergies** from interactions among system components. Through IGNRM we analyze system dynamics from the farmer's point of view, seeking synergies rather than pursuing disciplinary science for its own sake.

Agronomists, breeders, and socio-economists work together to gain a holistic picture of system constraints and opportunities from the smallholder perspective. This farmer-first IGNRM approach is reflected in our motto "Science with a Human Face". Priority needs and opportunities identified through IGNRM analysis are pursued using the best scientific tools and methods available.

Seven examples of IGNRM synergies that will be prominent in the MTP period are briefly described below. Detailed logframes, milestones and timelines can be found in the full MTP document (a sample logframe is shown in the Annex):

1) Integrating trees, water harvesting and more diverse crops in dryland farming systems. Low soil fertility and drought are widespread constraints in the drylands, and farmers have limited resources for purchasing fertilizer and organic matter, or irrigation. Our research has developed a 'Dryland Ecofarm' model for the Sahel combining rainfall runoff harvesting with the planting of trees that rebuild soil fertility, provide windbreaks, moderate the microclimate, and provide firewood. Trees increase water and nutrient recycling by sustaining a permanent root system (suppressed during the cropping season by coppicing). The improved soils enable a wider range of crops to be grown. Following this model, the Desert Margins Programme expects to foster the planting of one million high-value 'Pomme du Sahel' (*Ziziphus mauritania*) fruit trees in four West African countries by 2007, along with a range of more nutritious and remunerative vegetables and specialty crops.

Ridges harvest water while trees improve soil fertility for crops in Niger

Small-scale farmers in Africa enthusiastically purchase inputs when available in affordable small packs

2) Making markets work for the poor. The production of more diverse, higher-value crops and crop products only benefits the poor when they have effective connections to markets that will purchase the produce at remunerative prices. This requires stronger information flows concerning supplies and prices; systems and standards for product quality; credit, services, and coordination mechanisms; and policies that favor trade while protecting farmers from unfair competition. In collaboration with IFPRI, ILRI and other Centers we will develop forecasting models and analytical tools relevant to these objectives.

Crops and livestock are interdependent in the drylands

3) Integrating crop-livestock systems. Livestock are major components of dryland farming systems. Dry-season feed sources tend to be scarce and costly. Breeding and systems research jointly with an ILRI staff posted at ICRISAT Headquarters in India will help dryland countries increase dry-season feed supplies and quality. Healthier livestock in turn provide more income, draft power and manure to raise soil fertility for crops. Research on better herd management practices is easing the hardship of nomadic livelihoods while reducing rangeland degradation in southern Africa.

4) Reducing dryland system risks and adaptation to expected climate change. Drylands have always been especially risky for agriculturalists because of large variations in rainfall amount and timing. In addition to our partnerships with watershed consortia in India and other Asian countries, we're catalyzing a new consortium of 15 national, regional and international organizations in sub-Saharan Africa to research farmer responses to past climatic variability, to gain clues about future impacts of climate change. Our consortium is applying leading-edge tools including bio-economic modeling, geographic information systems, remote sensing, and climate forecasting.

5) Reducing risks from diseases, pests, and drought through plant breeding and marker-assisted selection. Our plant breeding research is adapting sorghum, millet, chickpea, pigeonpea and groundnut varieties to rainfall seasonality and to access more water through deeper root systems. Weakened plants are more susceptible to drought, so heat tolerance and pest and disease resistance, together with integrated pest management practices, are resulting in hardier, more resilient crop varieties, such as pigeonpeas resistant to wilt and groundnuts resistant to rosette and leaf diseases.

Breeding wilt disease-resistant pigeonpea has kept poor Tanzanian farmers competitive in export markets

6) Food systems and human health research is attacking the widespread 'hidden hunger' of malnutrition, and the dangers of cancer-causing aflatoxin. Through the HarvestPlus Challenge Programme and the Africa Biofortified Sorghum Consortium, the micronutrient content of cereal grains (e.g. iron, zinc, beta carotene) and quality of protein are being enhanced. Research on integrated approaches to reduce aflatoxin contamination in many crops is making headway, especially through deployment of an inexpensive, highly precise aflatoxin detection kit.

7) Farmer collaboration and co-learning models are modernizing our approach to knowledge-sharing and capacity-building. Increased farmer participation and farmer-to-farmer sharing of innovations will continue to be strengthened, notably by the integration of information technology tools currently under advanced testing, especially in India. Novel associations and institutions such as farmer field schools, rural radio and telecenters, warrantage (inventory-credit) associations, vertical integration of market chains (e.g. for high-value crops, biofuels production/processing, and agri-business incubation) are enhancing production efficiency, sustainability, food security, competitiveness and income in both Africa and Asia.

Alignment with CGIAR System Priorities

Our IGNRM agenda for the MTP period, as summarized in the table below is well-aligned with the new CGIAR Priority set that strongly targets the Millennium Development Goals.

Alignment of ICRISAT 2008 activities and budget with CGIAR Priorities: Darker green = larger investments. Annual investment in million US$ shown in parentheses; Priority totals at bottom. Additional investments that are not shown: 'blue-sky' research (Virtual Academy for the Semi-Arid Tropics - $1.2 m), development activities ($1.2 m), new research area (0.2 million) and formal training (0.06 m).

1. Sustaining biodiversity	2. More/better food through genetic improvement	3. Diversification and high value commodities	4. Improved water, land, and forest management	5. Policy and institutional innovation
1A Conservation of staple crops (3.2)	2A Maintaining and enhancing yield of staples (5.1)	3A Income increases from fruit and vegetables (2.1)	4A Integrated land, water, forest management at landscape level (2.4)	5A Science and technology policy and institutions (1.5)
1B Conservation & characterization of underutilized plant genetic resources (1.4)	2B Improving tolerance to abiotic stresses (4.3)	3B Income increases from livestock (1.0)	4B Sustaining aquatic ecosystems for food and livelihoods	5B Making international and domestic markets work for the poor (2.3)
1C Conservation of indigenous livestock	2C Enhancing nutritional quality and safety (2.9)	3C Enhancing incomes through fisheries and aquaculture	4C Improving water productivity (1.4)	5C Rural institutions and their governance (0.4)
1D Conservation of aquatic animal genetic resources	2D Genetically enhancing high-value species (0.1)	3D Sustainable income from forests and trees (0.4)	4D Sustainable agro-ecological intensification in low/high potential areas (3.0)	5D Improving research and development options to reduce rural poverty and vulnerability (0.6)
US$4.6 m	US$12.4 m	US$3.5 m	US$6.8 m	US$4.8 m

To enable exploration and innovation, the CGIAR Science Council also suggests that up to 20% of Centers' work could lie outside the Priority structure. Currently, about 6% of ICRISAT's investments are of this type.This includes investigations of the potential of new information and communication technology to enhance knowledge-sharing (Virtual Academy for the Semi-Arid Tropics or VASAT). It also includes institutional market-chain innovation, building public-private partnerships to accelerate the impact of research through our Agri-Science Park facility.

Investments in 'blue-sky' research can open new possibilities for development, as in this VASAT knowledge management event that connected India's former President Kalam (top left, and center) to farmers across the country through a Space Research Organization satellite link

Major emerging opportunities and initiatives

During 2008-10 we expect a number of major initiatives to take root and bear fruit. Some of the most visible will be the following:

Challenge Programmes (CPs) are the CGIAR's flagship mechanism to tackle major global problems by joining forces with world-leading external partners and applying cutting-edge science. We are already active in the Generation, Harvest Plus and Water and Food CPs. During 2007/08 the CGIAR may approve several more CPs, and we are a major player in them. We convene the Oasis Initiative (combating desertification) jointly with ICARDA, and have forged close partnership with AVRDC - the World Vegetable Center on high-value fruit and vegetable systems, also a potential CP. We are also among the most active Centers involved in the Climate Change CP candidate.

Genomics Lab at ICRISAT

CGIAR Systemwide Programmes foster cross-Center collaboration. We facilitate the emerging CGIAR Centers Alliance — Southern Sudan Consortium. We also continue to coordinate the Desert Margins Program, and participate in Systemwide Programs on Genetic Resources, Livestock, Integrated Pest Management and Rice-Wheat consortium in the Indo-Gangetic Plains.

Our **Genomics Laboratory** was recently designated a "National Center of Excellence" by the Government of India's Department of Biotechnology, netting a grant exceeding US$1 million to support its upgrading and expansion, including training facilities for building the capacities of national partners.

Enthusiasm and rapid growth characterize **public-private partnerships** being developed through our Agri-Science Park.The Hybrid Parents Seed Consortium, for example engages us with the Indian Council of Agricultural Research (ICAR) Institutes, State Agricultural Universities, and private seed companies in India to support research that develops yield-boosting hybrids. Our unique pro-poor sweet-sorghum-for-bioethanol partnership with Rusni Distilleries is gaining wide notice, and our biodiesel tree-cultivation partnerships are equally appreciated. In Africa, the National Small Farmers Cooperative in Malawi (NASFAM) has adopted aflatoxin testing of groundnuts to meet export quality requirements to the UK, catalyzed by ICRISAT research and partnership-building.

Finger millet is vital to the livelihoods of millions in East Africa

Our long and patient stewardship of neglected crops known as the **World Minor Millets** germplasm collection is finally gaining recognition, garnering funding from the Generation Challenge Programme to expand it over the next three years. ‘Minor’ millets are of major importance for millions of poor in East Africa and in the drought prone areas of Maharashtra State, India.

Emerging impacts during the 2008-2010 period

Impact path analysis

We seek to closely tie our work to its expected outputs, outcomes and impacts through a rigorous impact path analysis (IPA) approach. IPA maps the process through which an innovation is co-developed and shared with partners and ultimate beneficiaries (farmers, herders, extensionists, policymakers etc.) including feedback loops. These maps are tied to logframes that help us identify gaps and assumptions that could affect outcomes.

Through an IPA approach, we find ourselves thinking more rigorously about how we and our partners intend to translate our research activities into impact on the ground. Please see our full MTP document for impact path analysis diagrams and logframes for each of our ten operational Projects; samples are in the Annex at the end of this brochure.

Pipeline impacts

Across the IGNRM spectrum described earlier, we will continue to make steady progress and impact. Space does not allow a complete listing of pipeline impacts here, but several major impact areas that are expected to gain large visibility during the MTP period are highlighted below.

World Food Prize Laureate and eminent leader of India's Green Revolution Prof MS Swaminathan praised ICRISAT's pigeonpea hybrid breakthrough at the First International Conference on Indigenous Vegetables and Legumes, held at ICRISAT Headquarters in India in December 2006

Hybrid pigeonpea

The culmination of an intensive research partnership over more than a decade in India, the world's first hybrid food legume, or pulse grain, is now on the brink of major impact. Hybrid pigeonpea developed by ICRISAT and partners may increase yields of this important staple food by 30-40%. India's eminent "Father of the Green Revolution" Professor M. S. Swaminathan recently praised the achievement in glowing terms, stating that "*these hybrids are capable of launching a pulse crops revolution in the same way as the semi-dwarf varieties triggered the wheat and rice revolution in the 1960s*."

Cheap used drums (red, in background) feed water with fertilizer to vegetables through affordable drip irrigation lines in Ghana

African Market Garden

Our research has developed revolutionary new farming systems to help residents of the Sahel break out of the poverty trap once and for all. Through small-scale, water-conserving drip irrigation of high-value crops (vegetables, fruits) sold to urban areas, the poor can multiply their incomes while improving their household nutrition. More than 800 African Market Garden systems have been implemented in the least-developed country in the world, Niger, since 2002. A recent impact assessment concluded that most are still in operation and farmer net incomes have more than doubled on average. By the end of September 2007 450 AMGs are expected to be in operation in Burkina Faso and Ghana. The system is spreading into Cape Verde, Mauritania, Senegal, The Gambia, Guinea Bissau, Mali, and Chad.

Sustainable watershed intensification

Watersheds can generate prosperity through IGNRM, but are easily degraded if mis-managed

We've helped the dryland poor raise their incomes through more sustainable cropping, recycling nutrients and conserving water in fragile but high-potential dryland watersheds. India's former President Dr. A. P. J. Abdul Kalam recently lauded our partnership with India's national program ICAR in potentially doubling the productivity of soybean in Madhya Pradesh State to benefit five million farm families.

Small fertilizer doses make a huge difference (background) in West Africa

Microdosing

A decade of research has found that small, precision-placed doses of fertilizer can increase cereal grain yields by 50-100% in the drylands of both Western and Southern Africa. Microdosing is profitable even though fertilizer costs in Africa are three times the world average. Inventory-credit (warrantage) and small village retail outlet systems have been developed so that the poor can access and afford fertilizer in these areas. Microdosing has been tested by almost 200,000 farmers with good results and strong interest.

BioPower

With growing interest worldwide in renewable bio-energy to counter global warming and rising fossil fuel prices, we expect strong up-scaling of our BioPower initiative to empower the poor to benefit from appropriate bioenergy systems. These include dryland bioethanol and biodiesel crops (sweet sorghum, jatropha, pongamia and more) and institutional linkages that ensure that the rural poor, including women and the landless, are rewarded; and that food, fuel and fodder are all produced in ample quantities. Thousands are adopting these practices already in Andhra Pradesh, India and the MTP period will also see BioPower make major headway in Africa.

Landless tribal women find new income raising Pongamia seedlings for biodiesel tree plantations in India

To keep abreast of these stories as they unfold during the MTP period, please email us to request being added to our mailing list for our periodic, concise electronic highlights (SATrends) and major issue analyses (What ICRISAT Thinks).

Implementing the MTP

During 2008-10 we'll continue to organize our research-for-development through four Global Themes and three Region Teams.

The Themes ensure science quality, disciplinary coordination and spillovers of research benefits across regions. The four Global Themes (GTs) are: Institutions, Markets, Policy and Impact; Biotechnology; Crop Improvement; and Agro-ecosystems. A fifth group, the Knowledge Management and Sharing Office, leads the exploratory VASAT research described earlier.

The Region Teams maintain continuous, close contact with partner institutions in their regions, involving them in consultations, priority-setting and knowledge exchange, and ensure the delivery and impact of research. The three Regions addressed by ICRISAT teams are West/Central Africa, East/Southern Africa, and Asia. Our Headquarters are located in Patancheru, near Hyderabad, Andhra Pradesh, India. A deliberate process of decentralization of authority to the African regions has been underway for several years and will continue during this MTP period.

Resourcing

Meeting the aspirations of the 2008-10 MTP will require increased support from development investors. Rebounding from the very difficult funding environment of the mid-1990s, our budget increased by 63% during 2002-06 mostly through increased special-project support. The Institute must attract a further 40% gain over the next 8 years to achieve the Vision objectives, approaching $50 million per annum by 2015. In 2008, the first year of the new MTP, ICRISAT will need to raise US$33 million, a 10% increase over 2007.

Long-term investments build Africa's capacity for a better future

These gains, while impressive must be considered against a backdrop of flat core funding. Often, non-core (special project) funding seeks quick impacts, while core funding is required for longer-term objectives that could generate enormous payoffs a decade or more into the future.

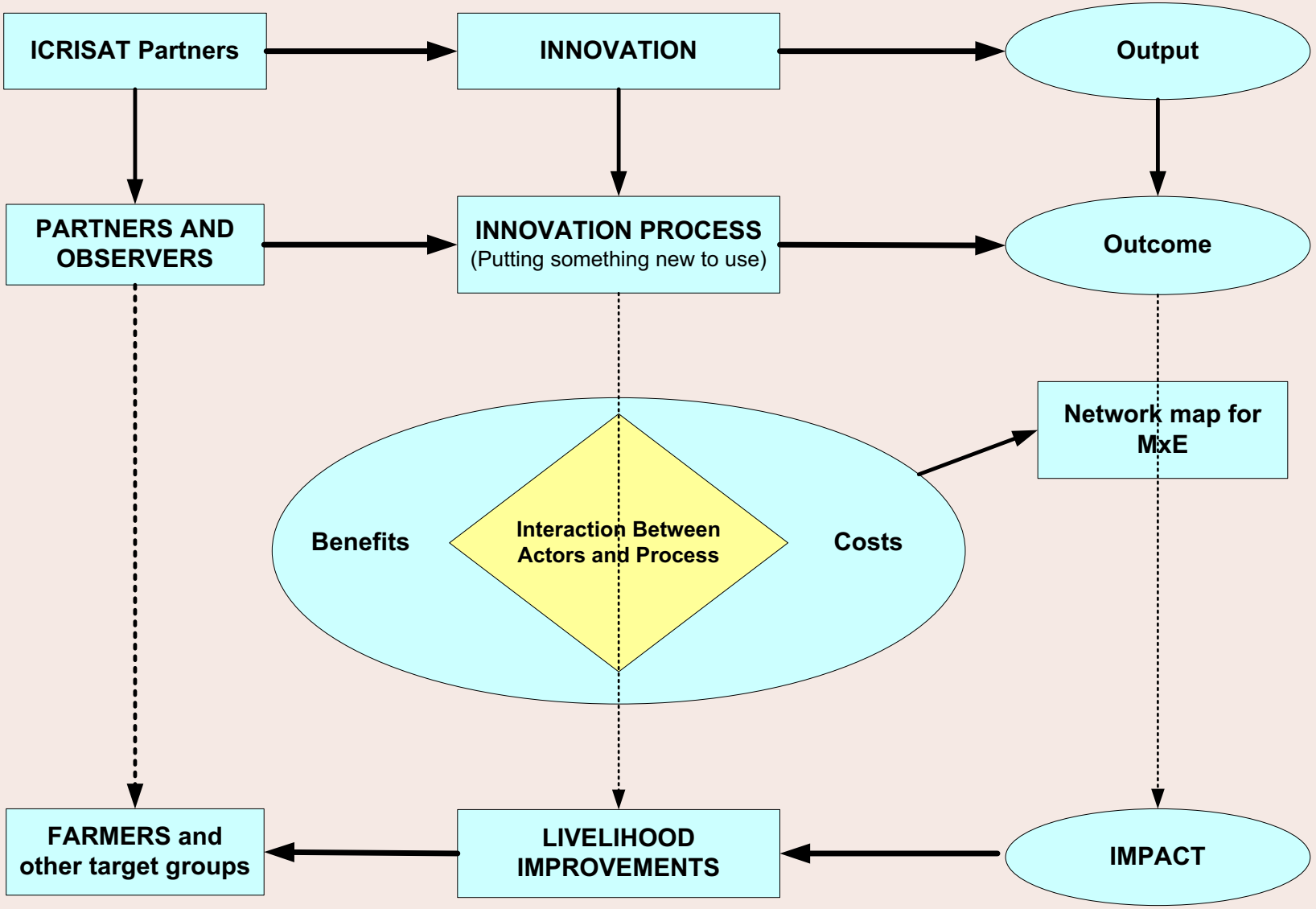
Many of the emerging impacts described here resulted from core investments begun a decade or more ago. This pipeline of hope for the future should not be allowed to stagnate. We will continue to dialogue with investors during the MTP period to articulate the value of long-term research investments, and to demonstrate them to investors' constituencies.

Annexes

ICRISAT's operational project set for 2008-10 including scale of investments, and linkages to CGIAR Priorities.

ICRISAT Projects 2008-2010	Expenditure Estimate 2008, US$	Relevant CGIAR System Priority
1. Improving policies and facilitating institutional innovation, markets and impact to support the sustained reduction of poverty and hunger in the SAT	$ 4.8M	5
2. Sustaining biodiversity of Sorghum, Pearl Millet, Small Millets, Groundnut, Pigeonpea and Chickpea for current and future generations	$ 5.1M	1
3. Producing more and better food at lower cost of the staple cereals and legumes of the WCA SAT (Sorghum, Pearl Millet and Groundnut) through genetic imp.	$ 3.0M	2
4. Producing more and better food at lower cost of the staple cereals and legumes of the ESA SAT (Sorghum, Millets, Groundnut, Pigeonpea and Chickpea) through genetic improvement	$ 2.8M	2
5. Producing more and better food at lower cost of staple cereal and legume hybrids in the Asian SAT (Sorghum, Pearl Millet and Pigeonpea) through genetic improvement.	$ 2.2M	2
6. Producing more and better food at lower cost of staple open-pollinated cereals and legumes in the Asian SAT (Sorghum, Millets, Pigeonpea, Chickpea and Groundnut through genetic improvement	$ 3.9M	2
7. Reducing Rural poverty through Agricultural Diversification and Emerging Opportunities for High-Value Commodities and products	$ 3.5M	3
8. Poverty Alleviation and Sustainable Management of Water, Land, Livestock and Forest Resources, particularly at the Desert Margins of the Sahel and the drylands of ESA	$ 2.0M	4
9. Poverty Alleviation and Sustainable Management of Water, Land, Livestock and Forest Resources through sustainable agro-ecological intensification in low- and high-potential environments	$ 4.7M	4
10. The Virtual Academy for the African and Asian SAT	$ 1.2M	Blue Sky
Development activities	$ 1.2M	Development
Stand-alone training	$ 0.1M	Training
New research area	$ 0.2M	
	Total$ 34.7M	

Impact Pathways Analysis



Sample logframe relating Project 9 outputs to impacts.

Output	Output Target	Intended user	Outcomes	Impact
A. New tools and methods for management of multiple use landscapes and climatic variability with a focus on sustainable productivity enhancement, developed and promoted with associated capacity building in collaboration with NARES partners in Africa and Asia	2007 Mechanistic model adapted for spatial simulation of African sorghum/millet phenology and biomass partitioning. Model released, along with updated genotype databases and simplified framework for extrapolating variety performance to larger recommendation domains	NARES agronomists and breeders, Alliance and CSI partners	New tools, approaches and technology options for sustainable development and improved livelihoods incorporated into the policy and implementation guidelines used by NARES partners	In rainfed areas, greater resilience to climate variability through integrated land and watershed management. Agricultural productivity and incomes has been increased in target countries
	2008 At least one farm-level response option to reduce the impacts of climate variability verified and developed with stakeholders	NARES, NGOs, Africa and Water CP, climatologists and policy makers	End users (farmers and their support agents) are better able to adapt to climate variability and change, with improved management of seasonal and annual climate risks.	Communities have experienced reduced vulnerability to climate variability and are more resilient and better prepared through the implementation of the improved risk management strategies.
	2009 One predictive toolset based on assimilation of in-situ measurements and satellite observations with models released for evaluating soil C sequestration options at farm and cropping system scales, including the role of livestock on C and nutrient balances	NARES, NGOs, climatologists and policy makers, ICWG-CC, Alliance partners		
	2010 At least one decision aid that supports strategic and tactical decision making in selecting appropriate responses to manage risks and capitalize on opportunities created by variable climate, developed and availed to stakeholders	NARES, NGOs, climatologists and policy makers	Decision makers identify and promote new strategies that exploit climate niches, through the use of tools that match commercial opportunities	New strategies that exploit climate niches, through the use of tools that match commercial opportunities have brought improved livelihoods for the SAT poor

The New ICRISAT

2004-05
- Fourth King Baudouin Award
- Rated Superior by CGIAR
- US $ 30 M budget
- High staff morale
- Budget surplus

2006-07
- New vision and strategy to 2015
- Two CGIAR Science Awards
- Fourth year of budget surplus
- High staff morale
- Rated Outstanding by CGIAR
- US $ 35 M budget (2007)

2002-03
- Team ICRISAT
- Third King Baudouin Award
- External reviews
  - Quality science
  - Sound management
- Institutional innovations
- Budget surplus (2003)

Mid 90s:
- Financial and human resource challenges
- Declining support

2000-01
- Institutional transformation through Science with a Human Face
- Grey to Green Revolution
- US $ 22 M budget

Forward together

The dryland poor seek better lives, and need the world's help. With growing support from development investors, ICRISAT, the CGIAR, and our partners across Africa and Asia will forge ahead during the 2008-10 MTP period. We would be delighted to have your partnership in helping the poor grow a greener future.

William D. Dar
Director General

ICRISAT
Science with a Human Face

About ICRISAT

The International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) is a non-profit, non-political organization that does innovative agricultural research and capacity building for sustainable development with a wide array of partners across the globe. ICRISAT's mission is to help empower 600 million poor people to overcome hunger, poverty and a degraded environment in the dry tropics through better agriculture. ICRISAT belongs to the Alliance of Centers of the Consultative Group on International Agricultural Research (CGIAR).

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